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I.

ANNUAL ADDRESS.

By Chief-Justice Charles P. Daly, President.

Subject: THE GEOGRAPHICAL WORK OF THE WORLD IN 1873.

Delivered January 13th, 1873.

Ladies and Gentlemen and Fellows of the Geographical Society,—At a dinner given by the members of the Society last year to Mr. Stanley, a distinguished bishop, who was present, asked me what was the object of geographical societies. If the worthy bishop had expressed what was possibly passing in his mind, the form of the question perhaps would have been: What is the use of them? He no doubt felt that if he wanted to know anything about geography he had but to look into Bell or Malte Brun; that if he wanted information in respect to any particular place he had but to open the *Imperial Gazetteer*. I do not mention this in any spirit of complaint, for the bishop had not thought upon the subject, and merely expressed himself as occupied men have done in all ages. If, in the earlier part of the fifteenth century, any one had proposed in the maritime city of Lübec, or in that hive of scholars, Padua, to organize a society to promote geographical exploration and discovery, the busy would have felt that they had no time for such inquiries, and the learned would probably have replied that all that was known would be found in Ptolemy, and that what was not to be found there was not worth being known, for it would be but expressing the opinion of a world that, up to that time, had been content to rest satisfied for thirteen centuries with what Ptolemy had to communicate. It never would have occurred to their minds that, within a very short time, such a spectacle would be presented as that a great prince like Henry of Portugal, surnamed the Navigator, at a time when the fame of his military exploits filled Europe, should refuse the command of great armies tendered him respectively by Germany, England, and the Pope, to immure himself for the remaining forty years of his life upon a lonely promontory upon the southern extremity of Portugal, with books and instruments and the society alone of travellers and navigators, maturing that far-seeing scheme of exploration which brought the whole continent of Africa to the knowledge of mankind, and opened the way, by the Cape of Good Hope, to the coveted land of the Indies; or that the result of the conviction and efforts of a wandering sailor, upon whom the learned turned their backs, and to whom rulers would not listen, would be the discovery of a vast continent now covered with eighty millions of people, the great bulk of them the descendants of the then inhabitants of Europe.

The bishop's question may be answered by saying that during the many years that Prince Henry and his associates were collected together upon the promontory of Sagres they formed what may be called a geographical society. Perfecting themselves in the knowledge of what was known respecting the globe, they turned their attention to the unknown. Cape Bojador, that dangerous promontory which stretches out on the north-west coast of Africa, in whose boiling surge and encircling currents so many a mariner has found his grave, was then the limit of the world's knowledge of the western coast of Africa. Prince Henry wished to know what was beyond it; and when he and his associates devoted themselves to that inquiry, they engaged in the work of a geographical society whose object is the same as was his, — to promote geographical exploration and discovery. There are not now, as there were then, great highways along the ocean to be tracked or great continents to be discovered, but there is yet one-seventeenth part of the globe of which we know nothing except by conjecture. The region which surrounds the south pole, the Antarctic, covers an area of seven millions of square miles. The Arctic measures nearly three millions. The unexplored portion of Africa may be put down at least as one million. The unknown part of Australia is certainly more than two-thirds of that amount, and in this connection I may mention the great islands of the East-Indian Archipelago, which stretch from the north-east corner of Asia to New Zealand, occupying the most favored part of the earth, and which have in extent the magnitude of a continent. One of this great group, Borneo, is consid ered the second largest island on the globe. A strip along the coast of about one hundred miles deep represents what we know of it; the interior and larger portion remains unknown. Papua, or New Guinea, is as large as, and may even be larger than, Borneo. What do we know of it? Comparatively nothing. Sumatra is 1,000 miles in length, and Celebes and Luzon are inferior only to Sumatra; and there are of this group, in addition, numerous islands of considerable size, some as large as Ceylon, and thousands of minute islands, many of which abound in spices and mineral ores.*

The practical, worldly man of to day, busy in getting money, may say, "What is the use of troubling ourselves about these islands that have remained so long neglected and are occupied chiefly by savages?" That question might have been put but a few years ago in respect to Australia when England merely used it as a penal colony. It is to-day an Australasian empire. When Columbus urged John II. of Portugal to aid him in his proposed attempt to reach this quarter of the East by sailing westward across the Atlantic, an attempt in the subsequent prosecution of which he discovered the continent of America, and that navigator's plan was submitted to the King's Council for decision, the learned Bishop Diego Ortez de Cazadilla, whose speech turned the balance and effected the rejection of the scheme, did not, like the subsequent Council of Salamanca, question the possibility of its achievement, but disposed of the project by saying that it would be neither glorious nor useful; that the idea alone was sufficient to demonstrate its inutility. "Let us be counselled; instead, go and fight the Moors, who are the enemies of our religion."

I shall not dwell upon other parts of the world; the regions in South America that are imperfectly known; the portions of Asia that have been, and those that are still, shut off from all intercourse under Mongolian or Mahometan rule, and the considerable portion of our own Western country which is yet to be fully explored. Nor can I do more than mention the great domain of physical geography where so much is to be done to ascertain the laws of the movements of the winds; the direction, velocity, and temperature of the great currents of the ocean, together with the causes which regulate that vast system of waters in their circulation over two-thirds of the globe, and that much more mysterious phenomenon of terrestrial magnetism, the key to which, when obtained, will unlock the secrets or laws of forces which materially affect the physical condition of the earth, its movements, and everything upon it.

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* *Borneo* — A. M. Cameron. Illustrated Travels, No. XLV.

It was with the view of drawing public attention to the importance of obtaining more exact geographical knowledge of the planet we inhabit that the first Geographical Society was formed in Great Britain, forty-three years ago; and that the stimulus which such a body can give to such an inquiry is very great, and the result it can produce extensive, is seen in the fact that there are now thirty-three of these societies distributed over the globe,— viz., in England, France, Holland, Belgium, Italy, Spain, Germany, Hungary, Russia, India, the United States, Mexico, Brazil, and Buenos Ayres. It is only very large societies like the Royal Geographical Society of London, which has now 2,700 members, paying two pounds each annually, and has, in addition, a permanent fund of over $100,000, and a stipend from government, making its annual income over $30,000, or the Imperial Russian Geographical Society, which is munificently supported by the government, that can engage in and defray the expense of explorations in the unknown parts of the earth. All these societies, however, have their influence upon public opinion, upon the governments of the countries in which they are situated, upon wealthy individuals who are willing to be useful by aiding with their means enterprises for obtaining geographical knowledge; and the result is found in the unusual activity which now prevails in this great field of inquiry. Expeditions during the year which have either returned, started, or are organizing, have been unusually numerous. In fact, at no time since the end of the fifteenth and the beginning of the sixteenth century has such zeal been manifested, or have so many enterprises been undertaken, for the exploration of the earth as during the last quarter of a century; and this is owing, in a great degree, to the influence produced upon the age by the associated effort and activity of geographical societies. Their object is not merely to accumulate and disseminate geographical information, for that will, in time, be done by the compiler and cartographer, with the aid of the scientific geographer. Their true sphere of activity is in impressing upon the age the necessity of this work, so vast in its details and so important in its results; in pointing out what is to be done, to what particular quarter exploration or inquiry should be directed, and the necessity or value of it. Instead of leaving the exploration of unknown lands to be undertaken, as it has heretofore frequently been, in a spirit of romantic adventure, their object has been to press the importance of scientific acquirements and linguistic knowledge upon all who are ready to encounter the toil, the privation, and the peril that are incident to such noble undertakings, that they may bring back what will be honorable to themselves and useful to the world. Finally, to keep the world at this great and useful work — to make it felt in every civilized land that, in the words of Isaiah, "The voice crieth in the wildernesses, Prepare ye the way of the Lord; make straight in the desert a highway for our God. Every valley shall be exalted, and every mountain and hill shall be made low: and the crooked shall be made straight, and the rough places plain." A command alike, and a prophecy, that to advance and spread civilization over every part of the earth is the duty of man and the end he is destined to accomplish.

Coast-Survey.

In giving, as has been my custom in the annual address, an account of the geographical work of the world for the year, I shall begin with a brief summary of what has been done in our own country. I have so frequently dwelt upon the value and pointed out the nature of the labors of the Coast-Survey, that I will merely name what was done last year. It has embraced operations upon the Atlantic and Pacific coasts, which in the summer were carried on on the Northern coasts, and during the winter on the Southern. The Atlantic portion has embraced surveys around the coast of Maine, Massachusetts, Rhode Island, New York, and New Jersey, particularly on the coast of Maine and adjacent islands, with which have been connected hydrographical labors, especially with reference to the tides and currents. The harbors between Portland and New York, and the harbors in the Chesapeake, have been examined for the preparation of sailing directions. On the coast of Virginia, North Carolina, Georgia, and Florida, the survey of rivers, inlets, bays, capes, etc., has either been begun or continued, and many observations have been made at different stations for latitude and longitude. Special observations have been made near North Adams, Massachusetts, for the determination of terrestrial gravity; at Port Jervis, in this State, for the magnetic elements; and, in the geodetic connection between the Atlantic and Western coasts, points have been occupied as far as Colorado; so that now every State and Territory of the Union along the belt including the thirty-ninth parallel has at least one point accurately determined in latitude and longitude. The same kind of general labors has been carried on upon the Pacific coast. It has consisted of field and hydrographic work on the coast of California and the neighboring islands and bays; the continuation of the important surveys of Columbia River, Puget Sound, and the adjacent bays and inlets, deep-sea soundings, the geographical recognizance of the coast, and special surveys of the harbors of Alaska.

These very important labors are of the highest value, and indicate, perhaps more than any thing else, the extent of the civilization of a people. Humboldt said to me in 1851, "I do not know that your countrymen appreciate it, but your great scientific monument hereafter will be your coast-survey."

ENGINEER CORPS, U. S. A.

In the operations upon the land, in the interior rivers, upon our great lakes and in the Western country, a large amount of practical work has been done by that distinguished body, the Corps of Engineers of the Army of the United States. I would willingly give an account of their labors, but will be excused when I say that it fills a volume, which is in itself a sufficient tribute to a body upon whose scientific attainments the nation depends when imperilled in war, and from whose scientific labors it derives so much in times of peace.

Commodore Wyman, the able head of the Hydrographic Office at Washington, has courteously written to us an account of what has been done during the year in that important department, embracing hydrographic labors, surveys, new charts, and important publications.*

U. S. GEOLOGICAL AND GEOGRAPHICAL SURVEY OF THE WESTERN TERRITORIES.

The year has been one of unusual activity in explorations and surveys in this country. There have been about twenty different expeditions apart from those already referred to, and independent of the geological surveys in the different States, most of the geological surveys which I enumerated in my last address having been continued. I could not, within the limits of this address, give even a summary account of these numerous expeditions, and must confine myself to a very brief statement of the results of the chief expeditions for the exploration of our large and imperfectly-known domain in the great West.

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* A running survey has been made by Commander Baker, commanding U. S. S. "Wyoming", of the Gulf coast of Mexico from the Rio Grande to Vera Cruz, and material errors discovered in the longitudes of many points on this coast, a detailed account of which survey he has kindly furnished to the Society. In the Pacific Ocean a survey has been made by Commander Dewey, commanding U. S. S. "Narragansett", of the coast of the peninsula of California, and the outlying islands, from Cape St. Lucas to San Diego. The U. S. S. "Portsmouth", Commander Kerritt, has been employed searching for dangers and shoals, marked as doubtful, between the Sandwich Islands and the coast of California; and as other duties have permitted, surveys have been made of harbors on the several stations by vessels attached to the several squadrons.

Commander Belknap, U. S. S. "Tuscarora", has been employed with marked success in getting deep-sea soundings in connection with the proposed Pacific cable.

Dr. F. V. Hayden, the head of the organization known as the United States Geological and Geographical Survey of the Territories, to whose previous labors we owe the knowledge of the wonders in the region of the Yellowstone, has been exploring in a new field during the year, having associated with him Mr. J. T. Gardiner, the head of the geographical branch of the expedition. The field of operations has been the eastern half of the mountainous portion of the Territory of Colorado, including the mining districts and the wonderful parks, mountain-ranges, and peaks; the area explored being divided into three districts of between seven and eight thousand square miles each. Each district was about 58 miles broad and 130 miles long; the northern including the Middle Park; the middle district, the South Park; and the southern, the San Luis Valley; the whole embracing some of the grandest ranges of the Rocky Mountains at their highest points of elevation, and forming the most extended groups of high peaks to be found upon our continent. This work embraced a trigonometrical survey resting on points astronomically determined, the triangulations being carried on by Mr. Gardiner, the geographer. The work was extended 120 miles west, 100 miles north, and 120 miles south to the second base in the San Luis Valley, 140 miles north-west of Denver. A careful and most interesting account of the labors of the expedition has been given by Prof. Whitney in a series of letters published in the New York *Tribune*, supplemented by a general account of the survey by Dr. Hayden himself, of which I would willingly, if I could, give a statement, but it occupies fourteen columns of that paper. I can

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The usual hydrographic notices, and notices to mariners, have been prepared as occasion required, and issued; as also the yearly lists of foreign lights. Sailing Directions for the Coast of Brazil, Part I; The Navigation of the Atlantic Ocean, Steam Lanes across the Atlantic, and Routes of Steamers between the English Channel and New York, West Coast of Africa, Part I; Sailing Directions for the Red Sea, and third supplement of Northern and Eastern Gulf Streams, have been completed and published. Fifty-eight charts have been corrected. Nine new charts are in process of engraving, and 119 have been prepared by the lithographic process A party has been organized and the necessary instruments prepared for determining the longitude by the electric telegraph of the West-India islands and the points on the northern coast of South America where the telegraph cable has been laid.

only, therefore, refer to what was done in the most general way. The position of every leading peak in 30,000 miles square has been fixed; a very important work, for the Territory of Colorado, says Dr. Hayden, comprises one of the most interesting areas on the continent, both in a geological and a geographical point of view, forming, as it does, the centre of elevation in the great chain of the Rocky Mountains. From the summit of Mount Lincoln, he says, the eye sweeps over a wilderness of high peaks, the like of which can be found only in the Himalayas or the Andes. "We reckoned," says Prof. Whitney, "after a careful count and estimate, that we had in view more than 150 peaks, none of which were below 13,000 feet, and 50 of which, at least, were 14,000," and adds that the summit of Mount Lincoln commands points in a region of country nearly 25,000 square miles in extent. "The exploration," he says, "of this summer will settle which is the highest peak or the greatest elevation in the United States. The very heart of the Rocky Mountains, the grandest uplift of the continent, is here. The range on which we were, running north and south for 100 miles, and which is broken into peaks ranging between 12,000 and 14,500 feet, seems to be the culminating point of the forces which built up our continent." He dwells on the Maroon Mountain, so named from the exquisite beauty of its color, and upon Castle Peak, over 14,000 feet high, which may prove to be the loftiest summit. It is extraordinary, he says, to see from some high central point the variety of form, color, and dip of these sandstone mountains, and declares that there is no other region in the United States that can vie with this in all that is grand and beautiful in mountain-building.

The valley of the mountain known as the Holy Cross was found to have been once the seat of an enormous glacier which has scored and cut up the gneiss rock upon the sides of the valley for one thousand feet high; and Prof. Whitney says that it may be doubted if so desirable an example of this effect of glacial action will be found in this country. I will only add that the work this year of Dr. Hayden and Mr. Gardiner joins on to that of Mr. Clarence King in the survey of the fortieth parallel, the field-work of which is finished, and the results of which Mr. King and his associates are now preparing for publication.

Yellowstone Expeditions.

There have been two expeditions to the region of the Yellowstone, one of which was under the command of Gen. Stanley, and was chiefly of a military character, to protect the work upon the line of the Northern Pacific Railroad against threatened hostilities of the Indians, but was at the same time, as far as circumstances would permit, an exploring and scientific expedition. Their route, from the Missouri to the Yellowstone, lay through a region but little known, part of which bears the name " Les Mauvaises Terres", or " Bad Lands". The country from Fort Stevenson, on the west ledge of the Missouri, for 200 miles south, is described as a land of desolation. They passed a continuous succession of hills, or, as they are called in Dakota, " butts," with wide chasms and gorges between, presenting a frightful appearance. They struck the Yellowstone in the vicinity of Glendive Creek, and proceeded up the route of the river for some distance beyond Pompey's Pillar. It was found to be navigable for eighty miles above Powder River. The entire length of the Yellowstone is about 550 miles, and from the information obtained in this exploration it is inferred that it will be navigable by steamboats for about 350 miles. Coal, iron, and other minerals were found, and some rare birds, among them a species of the sky-lark. In some parts of their journey they came across natural brickyards, the clay being cracked into blocks two inches thick by a foot and a half long; and in one place Gen. Stanley, instead of cutting down timber for a bridge, collected these natural bricks, or *adobes*, and made a good one across a gulley, over which the wagons passed in safety.

CAPT. JONES'S EXPLORATIONS.

The next expedition to the Yellowstone was under Capt. Jones, whose previous explorations in the Uintah Mountains I described in my last address. Capt. Jones's expedition was directed to what may be more properly expressed as the Yellowstone country, the vicinity of the wonderful geyser-region in Northern Wyoming, which is hereafter to be the national park. The chief object of this expedition was to ascertain how this interesting region can be made accessible to the traveller by a shorter and more feasible route, and of determining the practicability of a wagon-route or a railroad through the great national park, a competent scientific corps being attached to study the wonders of this extraordinary region. The line of march lay across what is known as the Colorado Desert, flanking the south-east extremity of Wind River, thence following up the Wind River valley to Camp Brown, which is on the right bank of the Little Wind River, just above the mouth of its northern fork, from whence they entered an unsettled and almost unknown land, where a base-line was measured from which the subsequent landmarks on their route were located. The route lay through a rolling and desolate country, in the course of which an attempt was made to ascend to the summit of a sharp peak, which they were unable to reach ; but, from the elevation which they attained, about 12,000 feet, the view was "grand and terrible, presenting as far as the eye could reach a jagged mass of dark-brown volcanic rocks, black in the shadows of the falling sun". The outlet of the Yellowstone Lake was reached on the 4th of August last, and it was found that the lake basin was abundantly watered and covered with a dense growth of pine. The return-route was through Wind River valley, and it was found that it would be practicable to make a railroad or wagon-road up this valley to Yellowstone Lake.

Before this exploration, Dr. Hayden's route was the only one known to the Yellowstone Lake; and the result of the exploration is that this route can be reduced 200 miles from the railroad, and for travellers from the East, 400 miles.

The scientific results of this expedition are valuable. The scientists who accompanied it say that this region affords a large field for the geologist, botanist, chemist, and zoölogist; and that it will be a long time before they can exhaust its material. In the Yellowstone Lake there is abundance of animal life. Dr. Hilzman found animal life in springs of 124° of temperature. He analyzed the waters, and is of the opinion that they cannot be utilized for medicinal purposes. The region is one to be visited only in the summer. They had frosts during thirteen nights in August, but the vegetation was untouched, the flowers being particularly remarkable for the brilliancy and permanency of their colors. Capt. Jones confirmed a discovery which Prof. Hayden doubted, that there was a small stream of water south of the Yellowstone Lake which afterwards divides into two streams, one of which flows into the Yellowstone, and thence into the Missouri to the Gulf of Mexico; the other into Snake River, leading from thence to the Pacific. He found this little stream, and traced the course of these two rivers springing from this common point. It was a little thread of water which flows but a short distance and then divides, a little island or peninsula separating it, one stream turning on its way to the distant Pacific, and the other travelling on its course to the remote Atlantic.

Lieut. Wheeler's Explorations.

I gave a very full account last year of Lieut. Wheeler's plan for his explorations and survey west of the 100th meridian. He took the field again last spring for a continuation of this important survey with a large staff of scientific assistants, and three officers of the Engineer Corps, the whole being divided into four main parties. Topography is the chief object of the survey, but with it are connected observations in astronomy, geology, mineralogy, and natural history. The main feature this year has been the exploration of the White Mountains of Arizona and the plateaux which border them lying south of latitude 34° and east of longitude 110°,—embracing fine farming, grazing, water, fish, and game countries, which were found entirely uninhabited by Indians. I will give the results derived from a communication in the *Tribune*, evidently written by a member of the expedition. The region traversed is one alternating between fertility and barrenness; but little rain falls, and nothing, it would seem, can be done in Colorado, New Mexico, and Arizona without artificial irrigation. New Mexico abounds with good summer grazing-grounds on the table-lands, and both it and Arizona are rich in the precious ores; but the want of water, fuel, and the cost of transportation, prevent the profitable working of the mineral district. New Mexico, it is said, is not likely to rank as a great agricultural region, but may become a rich mining-centre and a great wool-producing State. Arizona presents many facilities for agriculture. From the valley of the Rio Grande to the summit of the Sierra Nevada and west, there is every variety of soil, climate, and scenery. The amount of the rainfall is about the same as in New Mexico, but no agricultural enterprise is possible without irrigation. The middle, western, and south-western portions of Arizona are one vast desert, with only two principal streams, the Colorado and the Gila, the Gila being the more important in a utilitarian point of view. It drains a vast extent of country, and numerous tributaries have fine bottom-lands, and the mountainous country inclosing them abounds in fine grass, timber, and grain. The higher and barren mountains parallel with the Gila are rich in the precious metals and coal, and will probably sustain a mining population as the river furnishes the means of transit. The plateaux and mountains of Arizona comprise about one-sixth of its area, and are very rich in wild grasses, and are covered with fine timber, especially the White Mountain country, recently explored and now opened for settlement. It is plentifully watered, and offers great inducements to immigrants. The Colorado plateau is a pasture-ground of great excellence for hundreds of miles, but wants water. The country adjoining the Colorado River is probably the hottest in the United States, and is almost destitute of vegetation. The maximum heat in summer is found to be 130° Fahrenheit, and the minimum in winter is 25°. The thermometer reaches 90° nearly every day in the year, and, what is very remarkable, no case of genuine sun-stroke has ever occurred west of the Rocky Mountains

Yale College Expedition.

The Western exploring expeditions which have been instituted by Prof. Marsh, of Yale College, were continued during last summer, and embraced a journey of 700 miles, from Salt Lake City to a point on the Columbia River west of the mouth of the Des Chutes River. The Blue Mountains were crossed, the Shoshone Falls visited, and the route on approaching the Columbia was through the valley of the John Day,— a region as yet but imperfectly delineated upon our maps. The observations made during the journey seemed to warrant the conclusion that Salt Lake had formerly a northern outlet, and the terraces examined indicated that the lake is but the remains of what was once a vast body of water equalling in magnitude our great lakes. That the lake had at an earlier period a southern outlet into the Colorado is already known. The region about the John Day River was carefully explored by Prof. Marsh, and found to be a very rough country. In the pliocene formation were found the remains of various species of fossil horses, rhinosceroses, and camels. The collections made were numerous, and five tons of specimens were brought back.

The explorers received great attention from the Mormons, which has this curious explanation:

In the Book of Mormon, certain events are related as occurring in the prehistoric period of America, in which horses are mentioned. The Spanish historians state that no horses were found in America, and that they were introduced by the Spaniards, a statement relied upon as proof of the fabrication of the Mormon work. The discovery, therefore, by Prof. Marsh, last year, of the fossil horses in Oregon has given great satisfaction to the Mormons, being regarded by them as proof of the inspiration of the Book of Mormon.

The deposit of the fossil remains of animal and vegetable life in these treeless and desert plains is so great, that the geologist will be able to reconstruct the physical history of these long past ages. Dr. Hayden, in 1857, discovered on the Niobrara River one of these graveyards, as he calls them, in which the remains of animals are entombed. He found several species of extinct camels and a great variety of horses, — one about the size of our ordinary domestic animal, another about as large as a Newfoundland dog, which had three hoofs to each foot — and Dr. Leidy has identified no fewer than twenty-seven species of the horse family which lived upon the continent before the appearance of man, or about three times as many species as there are now throughout the world.

A party have explored Crater Lake, in Oregon, twenty-five miles from Klamath. It was found to be thirty miles in circumference without any shore, being entirely surrounded by high volcanic walls, and presented a scene of weird and wild magnificence. It is a place of great religious reverence among the Indians. Whence this vast body of water comes or where it empties is unknown. It is evidently the crater of a volcano, and probably one of the largest in the world.

W. H. Dall's Explorations in the Aleutian Islands.

The expedition, under the direction of Wm. H. Dall, to the Aleutian Islands and their vicinity is especially interesting. It has embraced observations upon the meteorology, specific gravity, and temperature of the sea-water, both at the surface and at various depths, and of the nature and direction of the oceanic currents of the North Pacific as well as of the tides of the Aleutian Islands, which have been ascertained to be of a compound and very complex character. The climate of the islands is found to be mild and uniform, not so cold as that of Philadelphia; but the barometer is subject to many and extreme fluctuations. Surveys have been made of several harbors, especially of the harbor of Kyska, with reference to its feasibility as the landing-station of the Japanese cable, which, after the examination of the other harbors, appears to be the only one that meets all the requirements. Islands were ascertained to be erroneously located, and reefs assumed as connecting islands were found not to exist. Deep-sea soundings were taken, and no current appears to exist in the eastern part of Behring Sea. Collections were made of prehistoric crania from caves, and of bone and stone implements and carvings. It was found that the fauna and flora do not exhibit Asiatic influences in a westerly direction, but, on the contrary, become more Arctic and meagre in their character, until at last, on the westernmost island, they are nearly wholly Arctic.

A survey was made during the year of the Colorado Desert to the Gulf of California, with a view of converting a part of the desert into a lake, by turning the waters of the Colorado River into it, which, if achieved, would greatly ameliorate the climate of Southern California and make a large part of it habitable. Of the result of the survey, however, I have no information.

Dr. T. Sterry Hunt, our corresponding member, has been investigating the paleogeography of the United States as illustrated by the formations which exist and the changes which have taken place in the Blue Ridge of Virginia, and the Carolinas, especially as shown in the decay of the crystalline rocks which make up the great eastern barrier range of the Appalachian valley and its causes. His conclusion is that the Blue Ridge, which is one of the oldest mountain-elevations of our continent, has not, like the White and Green Mountains, which are a part of the same great chain, been submerged since that remote time when the deposit of the fossiliferous rocks began.

A party succeeded with great difficulty in making their way to Lake Okeechobee, a great dismal lake in Florida, from twenty to forty miles wide, and supposed to be sixty miles long, which is surrounded in part by a dense forest of cypress, and in part by vast impenetrable swamps, the tall reeds which grow in great profusion upon its shores entirely concealing it from view. The explorers sounded in what they supposed to be the centre of the lake, and found it to be 170 feet deep. They discovered four islands, and upon one about six miles long, upon a high cliff, they found a semicircular arrangement of rude stones facing the east, in front of which was a stone structure or pile about twenty feet square. The question naturally arises, was this a stone circle erected for religious rites, like the stone piles which are found extensively dispersed throughout Europe, in India, in Palestine, and in Persia, and which are supposed to have had a common origin? A question I will leave to the archæologist.

Having opened this archæological subject, I may as well give here a brief account of the archæological results of the year.

ARCHÆOLOGICAL DISCOVERIES.

Many years ago, Mr. D. O. King, of Newport, R. I., transmitted a paper to this Society giving an account of the extraordinary ruins he had explored in Cambodia, in a journey made to that country from Siam.

We have now an account of their exploration by the French government, conducted by Lieut. Garnier, who has described the remains of what is known as the city of Angcor. Its ruins are distinguishable for their magnificence, the elaborateness of the sculpture, and their extent; the four sides of the principal temple measuring two miles and a quarter. Wandering through the remains of endless roads, buried in forests and jungle, Lieut. Garnier came upon the ruins of monument after monument, each, if possible, more astonishing than the preceding. The architecture and sculpture exhibit a very advanced knowledge of the arts, and the main temple is described as the masterpiece of some unknown Michel-Angelo. A Chinese traveller, in 1292, described Angcor as a splendid city; and, about 300 years later, Ribodeneyra refers to it as an ancient ruin in Cambodia. This is all that there is of its history.

The expedition of Mr. Smith for the investigation of the Assyrian remains has been especially fruitful. He last year brought home 400 inscriptions throwing light upon the history, astronomy, geography, mythology, and language of Assyria, besides various objects of art, domestic utensils and implements. It will be remembered that the very interesting tablets heretofore discovered by him, giving an account of the Deluge, were in one part defective; and it will be gratifying to know that he has this past year discovered the missing portion, and that this curious record is now complete.

Three catacombs were discovered near Kertch, in the Crimea, in the interior of which were paintings in fresco, in bright colors, representing battles. These tombs are supposed to be the work of an Oriental people, from the weapons and costume of the warriors, which resemble those found on the Assyrian monuments. The battles represent a struggle between men without beards, with lances and shields, and whose bodies are covered to their knees with armor, whilst their adversaries have beards and thick long air, and are armed with bows, lances, and square shields. The bearded men appear as if besieged, and the tombs and frescoes are supposed to be the work of the men without beards.

The recent excavations made in Rome have revealed that the ancient city before the republic, in the time of the kings, was large, strongly fortified, and must have contained an immense population. This is contrary to the impression of modern historical critics, and confirmatory of the tradition which prevailed in Rome in the time of Livy. A large number of photographs taken of the excavations in their present state have been exhibited during the year in London, which show the great size and importance of the earliest buildings in Rome. The foundations of the ancient city have been laid open, which consist of enormous works, many of which were great tanks and wells. The foundations are constructed of oblong blocks of tufa put together without mortar, the style of building being the same as that found in the ruins of Etrurian cities.

The Etruscan language has hitherto been a sealed book. The ruins of Etruria are of the deepest interest, and the inscriptions found there very numerous; but no one has been able heretofore to decipher them. A key at last is said to have been discovered. Two dice were recently found in a tomb, which, in place of being marked with pips, or dots, as is usual, are marked instead with words, and these words are identical with the first six digits in the Altaic branch of the Turanian family of languages. Following this clew, the Rev. J. Taylor has investigated 3,000 Etruscan inscriptions; and if his conclusions should be correct, these two dice will, in connection with previous researches, do for the Etruscan language very nearly what the Rosetta Stone did for the Egyptian hieroglyphics.

Dr. H. Schliemann terminated his excavations upon the supposed site of Troy last summer. He thinks that he has discovered the Skaean gate, Priam's palace, the tower of Ilium, and the great wall described by Homer. He writes Mr. Southworth, our Secretary, of his discovery of a great wooden box containing jewels, precious stones, ornaments and arms, such as battle-axes, shields, and an immense goblet of pure gold, with two handles and two mouths, which box, he says, has disappeared. He writes that the Greeks will not allow him to make excavations in Greece unless he give up all that he discovers, and that his next excavations will probably be in Sicily.

In the island of Delos a whole temple has been laid bare, and the ruins of a city discovered; and additional excavations, attended with important discoveries, have been made in Pompeii.

The scientific world was startled by the announcement during the year that Mr. F. Calvert, a geologist, had discovered in the Dardanelles conclusive proofs of the existence of man at a time so remote as the miocene period of the tertiary age, the most important of which was a rude engraving of a quadruped upon the fragment of a bone, which must have been the work of human hands; but subsequent investigations have thrown doubt upon the correctness of his conclusions as to the age of which these remains belong.

A stone has been found on a farm in Parahyba, in Brazil, containing an inscription, which, upon examination by the director of the Museum of Rio Janeiro, was found to be in Phœnician characters. I refrain, until further corroboration, from saying any thing more respecting this discovery, which, if an ancient memorial, would prove that the Phœnicians had visited America at a very early period.

Additional discoveries have been made during the year in Europe of lake-dwellings and of caves, containing human skeletons and implements of the same general character as have been brought to light during the past few years.

Prof. W. C. Kerr, geologist, of North Carolina, has discovered that the large mica beds of that State have been extensively worked by the aborigines, for what purpose is not known, but he supposes for mirrors or window-glass, as plates of mica are frequently found there three feet in diameter.

Dr. Schmidt, of Essen, in Germany, who passed some time in this country in anthropological investigations, states, in a paper just published, that there have been well-authenticated instances of the discovery here of human remains of extreme antiquity; and that a skull found in California is the oldest specimen of human remains yet discovered in any part of the world; that it places the existence of man beyond the glacial period, and, what is very remarkable, that the skull is of a comparatively high type, showing that the race to which it belonged must have had a considerable development at that time. Geologists find that the oldest rocks are upon our continent. This skull, if Dr. Schmidt's opinion should be confirmed, would show also that the earliest evidence of man is here; and it would be very curious if, as has heretofore been hinted, the ruins of Mexico and Central America should prove to belong to the earliest civilization upon the globe. It would show that Columbus, instead of discovering a New World, discovered an old one.

ARCTIC.

In my last address I expressed great apprehension of the fate of the "Polaris", and my hope that a vessel would be sent out to search for her; apprehensions but too fully confirmed by the subsequent news of the extraordinary escape of Capt. Tyson and his associates, and the later news of the picking-up of the remainder of the officers and crew by the Dundee whaler, the "Arctic'. Great praise is due to the Secretary of the Navy for the promptitude with which he despatched the "Juniata" and the "Tigress" to search for the survivors; an act in which he had the sympathy and approval of the whole people. It is to be regretted that Capt. Hall, through whose energy and perseverance Congress was induced to authorize this expedition, did not survive to enjoy the fruits of it, and to be regretted, when so much was gained, that the attempt was not made to do more. It was an unusually favorable year, or, what is called in Arctic phraseology, a very open one. When the farthest point was attained, 82° 16′ north latitude, the vessel had made a run of 600 miles in five days; and, if we leave out her detentions, she had made the run from New York to that point, the farthest ever attained by a ship, in nearly the same time that it would have taken her to cross the Atlantic. When she was stopped there it was by loose ice, she being then little more than 400 miles from the pole.

I feel that it is a delicate thing to say that a further advance might have been made, as there is not only a difference of opinion upon that point amongst those who were on board, but it is difficult to reconcile the various statements that have been given, so as to know exactly the true state of facts. Capt. Tyson tells me that at 12 M. on that day when the vessel was stopped by the ice, he saw from the mast-head open water in almost every direction beyond, and land lying as far north as he could see, and that there was then a clear water-sky ahead. Tyson further says that afterwards the channel was open to the north-east, and that the vessel could have gone further north, but that Capt. Hall, yielding to the opposition of Capt. Buddington, decided (against the views of all the other officers) to abandon any further attempt to advance. I have conversed very fully with four of the crew,—Kruger, Anthing, Nindeman, and Lingvist,—whom I found to be experienced seamen, and very intelligent men. They do not agree with Capt. Tyson, that it was feasible to get further north with the vessel. Kruger, an exceedingly intelligent man, who was on duty as the look-out, when the further progress of the vessel was stopped by the ice, at 6 o'clock A. M., says the morning was misty, but that he could see about a mile ahead, and that there was no sign anywhere of open water. They all unite in the statement that there was a steady current flowing into the mouth of Robeson's Channel from the north, at the rate of about a mile an hour, and drift-wood upon either shore, but say that from the large flakes of heavy ice that were coming down, and the entire absence of any swell, they were of opinion that there was no open sea beyond. Kruger afterwards carefully observed an elevated position north of Newman's Bay, the trend of the land both at the east and the west, from the highest point reached, as far as it was visible with a glass. He states that he saw a bay or strait which sets in to the westward immediately north of Cape Union ; that it was narrow, and he supposes it to be a strait, as he could see no termination; that north of this bay or strait a highland extends in a north-easterly direction, and that the water-sky which Capt. Tyson supposed he saw was the mist upon this highland. In his opinion, the current sets along this land from N. N. E. into Robeson's Channel, bringing down the heavy flakes of ice which blocked up the mouth of the channel, and obstructed the further progress of the "Polaris". On the opposite or Greenland side when it reaches its farthest northern limits at 83°, the land, it was found, trends to the east, indicating that Greenland is probably an island. From this configuration there would appear to be water to the north-east, extending over considerable space which may then have been so covered with ice as to prevent the passage of a ship. But no attempt was made to investigate, although, as I have stated, Tyson declares that there was a channel open to the north-east, at the very time when it was decided to advance no farther. It is difficult to understand why a further attempt was not made in that direction, as there was at least a possibility, even if the pole could not have been reached, that the vessel might have gone to the east or north-east, and possibly have come around the east coast of Greenland, which, if accomplished, would have been one of the proudest achievements in the history of Arctic exploration. That more was not accomplished must, if Capt. Tyson's statement is correct, be attributed to the influence of the second officer, who had what Hall had not, a knowledge of navigation and previous Arctic experience, but who, from Tyson's account, did not share in Hall's enthusiasm and determination to reach the pole; whilst, on the other hand, the men with whom I have conversed insist that Capt. Buddington's course was judicious; that as the season was far advanced it would have been incurring great risk to have attempted then to get further north; that Capt. Buddington was an able seaman, who had had, in the command of vessels, great experience in Arctic navigation; and that his advice to Hall to return and find a safe winter harbor was the counsel of the man on whom the whole responsibility rested, as he was the one upon whom everybody on board depended.

As the American theory has constantly been that the true course to reach the pole is by the way of Smith's Sound; as that was the belief of Kane, and the conviction of Hayes, and is confirmed by what was accomplished by the expedition of the "Polaris", it is to be hoped that the American government will not stop, now that the way is indicated, and allow another nation to accomplish what we have done so much to attain; but that, on the contrary, the honor which will follow the accomplishment of this great geographical achievement will be the reward of American enterprise, and that the first flag which floats over the pole will be our national ensign.

The Swedish expedition under Prof. Nordenskjöld having failed in its attempt to reach Parry Island, the vessels went into Mussell harbor in Spitzbergen, and in three days were inextricably shut in by the ice. This had scarcely occurred when the startling news reached them that six Norwegian fishing-vessels, with an aggregate of fifty-eight men, were frozen in near a neighboring promontory. Nordenskjöld's own resources were limited, as one of his vessels was to return to Sweden when they were all frozen in. He said, however, to the Swedish fishermen, that if they would conform strictly to discipline he would share his food with them, and advised them of an abandoned house at Ice Fiord, to which eighteen of the Norwegians went. Two of the Norwegian vessels were relieved by a storm in November, 1872, and thirty-eight reached home after vainly attempting to rescue their countrymen at Ice Fiord. In the spring of 1873, Capt. Meck went to their rescue and found them all dead. A diary had been kept from the 7th of October to the 3d of March, 1873, the perusal of which showed beyond doubt that they had lost their lives from want of experience, having practised no bodily exercise nor busied themselves in any employment. The preservation of the Swedes who returned safely last August, and who had been in the same situation, was due to their constant employment, discipline, and active bodily exercise. They lost but two men; the remainder returned in good health. This admirably organized expedition accomplished little in its attempt to get near the pole, and adds but another proof to the difficulties that exist in that direction. The scientific results of the voyage, however, are considerable. By dredging and by magnetic, meteorological, botanical, and geological observations, they gathered a large amount of information throwing light on the nature of organic life in the Arctic, and upon the physical changes which that region has undergone.

Prof. Mohn, of Christiania, has published an elaborate account of the land east of Spitzbergen, explored by three Norwegian captains in 1872, which is valuable as it is the first accurate account of what was discovered, and is accompanied by a map laying down the routes of the explorers, and the position of the land.

In May last, Mr. B. L. Smith, in the steamship "Diana" with his yacht, the "Samson", as a tender, made a voyage to Spitzbergen, and, being unable to penetrate beyond 79° 30′ north latitude, was compelled to put back, when he proceeded to Mussell Bay, where he found the Swedish expedition. He afterwards renewed his attempt, but the furthest point north reached by him was 80° 56′ in east longitude 70°. He returned in September last, having found North Cape to be an island. In the course of the voyage he made some surveys, took numerous soundings, and brought back a collection of botanical and zoölogical specimens.

The "Albert," which was sent out toward the close of 1872, to rescue the crews of the Norwegian vessels before referred to, made during her voyage a number of observations upon the temperature of the air, of the sea, of the currents, and upon barometric pressure and the wind, which are of great value to the science of meteorology.

Capt. Potter, who returned last year in the "Glacier" from a whaling-voyage in the Arctic, and is now in this city, passed some time in the vicinity of the place where Sir John Franklin and his companions abandoned their vessels. He procured from the natives in Repulse Bay various relics, such as silver spoons, forks, etc. He heard from them an account, in which he places reliance, of the division of the survivors into two parties; of the manner of the death of Sir John and his associates; and thinks, from the narration given, that he knows where the remains of those that perished will be found.

No news has been received from the "Tegethof", of the Austrian expedition for the exploration of the sea east of Nova Zembla, whose last destination, August, 1872, was Cape Tscheljuskin, the northernmost point of the continent of Asia. A vessel was despatched from Tromsö for Nova Zembla to make inquiries, but she had not returned before the winter set in.

Capt. Markham, R. N., went in the Dundee whaler, the "Arctic," to make observations in reference to the contemplated expedition from England for the discovery of the north pole. The vessel went into the Gulf of Boothia, an entirely new whaling-ground, where whales were found in great abundance. At Port Leopold, at the entrance of Prince Regent inlet, the provisions left there by Lieut. James Ross, twenty-five years ago, were found in excellent preservation and fit for use. Also, at the place where Capt. Parry wintered more than fifty years ago, the provisions deposited by him were found pretty much in the state in which he had left them. At Cape Garry, on Melville Peninsula, Capt. Markham found an abandoned Esquimaux settlement of thirty-four huts formed of the skulls and ribs of whales. From the indications presented, he concluded that the settlement had not been inhabited for a century.

THE ISTHMIAN CANAL.

The practicability of a ship-canal across the Isthmus of Darien has been tested by an exploring expedition under Commander Selfridge. Briefly stated, the route, on this line, selected by Commander Selfridge, which is by the way of the Atrato from the Gulf of Darien, and terminating on the Pacific near Cupica, contains one hundred miles of river navigation of the Atrato, which can be navigated by the largest ocean-steamers. An artificial cut of only twenty-eight miles in length is necessary between the Atrato and the Pacific. During twenty-two miles of this distance the rise would amount to but ninety feet, and would be gradual. The six miles to the Pacific include an open cut and a practicable tunnel three miles long. The cost of the whole is estimated at $60,000,000, and ten years would be required to complete the work.

The Nicaragua Surveying Expedition, unde Commander Lull, has proved the existence of a practicable route for an interoceanic ship-canal, beginning near Greytown on the Gulf of Mexico, ascending the San Juan River to the lake, and terminating on the Pacific at Brito, having Lake Nicaragua at its summit-level. The total length of the proposed canal is sixty-one miles and seventy-four hundredths of a mile, of which nearly forty-eight are in excavation and embankment. No tunnel is required. The harbors at Greytown and Brito, the two extremities of this route, it is thought, can be readily improved.

SOUTH AMERICA.

Prof. James Orton, of Vassar College, N. Y., has just returned from South America, where he had been engaged in a second exploration of the Amazons. The general object of his recent travels in South America was to supplement his expedition in 1867, when he crossed the continent from west to east, *via* Quito and the Nipo wilderness.* The chief object of his exploration was to study the physical geography, geology, and topography of the Amazons, and he obtained a vast amount of new and reliable information. He found that the Upper Amazon (Marañora) had been grossly misrepresented in all the more recent maps of Peru. He made everywhere, but especially in Northern Peru, large collections in natural history, throwing light upon the distribution of animal life, and was successful in unearthing a valuable collection of incarial art. He studied, also, the commercial resources of the region bordering the Amazons and its various tributaries, and will condense the results of his expedition in a work on the physical geography, natural history, and commercial resources of the valley of the Amazon. This distinguished traveller and naturalist has added a great deal of valuable knowledge to the geography and zoölogy of Amazonia.

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* His route in 1873 was up the Amazon from Para to Yurimaguas on the Hoallaga River; thence up the Paravapura and its tributary, the Cachiyeen, to Balsa Puerto; thence over the Icuto range on foot to Moyobamba; thence across and among the Andes to Chachapoyas and Cayamarca, crossing Upper Mavañon, or Balsas, and striking the coast at Pacasmayo; thence to Lima and its immediate region; thence to Mollendo, Arequipa, and Puno on the shore of Lake Titicaca.

Our member, W. H. Hurlbert, Esq., has, during the year, made a journey through the several states of Central America, and thence, by way of Panama, to Lima, whence he crossed the Cordilleras of the coast by Mollendo and Islay to Arequipa. In company with Mr. Thorndike, the engineer-in-chief of the Puno Railway, he went in the first train which crossed the Grand Cordilleras at a height of 15,634 feet, and thence to Lagumillas and Lake Titicaca. From Peru, Mr. Hurlbert passed by Bolivia and Chili, and through the Strait of Magellan to Rio Janeiro, and is now preparing for publication an account of this extensive journey, and the information, geographical and otherwise, he has gathered.

The locomotive, on the trial from Arequipa to Puno, reached Inlica, thirty-three miles from Puno, and near the northern shore of Lake Titicaca, on the 7th of September last, so that the difficulties of crossing the Andes by rail are now overcome.

The singular phenomenon occurred in Bolivia, of the rapid disappearance of land near La Paz. At one o'clock in the morning, on the 29th of August last, a sudden noise was heard, and on the following morning it was found that a large and fine tract of land, situated at the foot of the heights of Potosi, had gone down out of sight. Five Indian huts, with their gardens, suddenly disappeared, and other houses in the vicinity were left in ruins.

Capt. Musters, who had accomplished the extensive journey through Patagonia, made the attempt during the year to pass from Valdivia to his farthest north-west point when exploring Patagonia. He reached a lake, after crossing the pass of Ronco, in 40° 12′ north latitude, at an elevation of 2,540 feet, his farthest point; whence he returned across the snowy plains to Valdivia.

The government of Peru has for some years been expending vast sums of money in exploring the little-known portions of Peru which lie to the west of the Andes; and Señor Raimondi, a scientific man of the highest character, has, in the service of the government, been also exploring the remote valleys between the Cordilleras and at the head-waters of many of the rivers which flow down the northern slopes to the eastern plains,— a work in which he has been engaged for twenty years. The announcement is now made that the labors of Señor Raimondi are to be utilized in the publication, by the government, of a magnificent illustrated work, which is to embrace a narrative of his explorations, and the result of all his researches upon the geography, natural history, and climate of Peru.

EUROPE.

The main geographical work of Europe has been the carrying-on of those great topographical surveys by the nations which I mentioned in my last address, a geographical labor the value of which has been strikingly illustrated by the late war between Germany and France. When France moved to invade Germany she was not only wanting in a geographical knowledge of the country she was about to enter, but even of her own territory; whilst the people she meant to attack were a nation of geographers, thoroughly acquainted with the topography of their own country and accurately informed of the geography of France, so far as it was material in aggressive or defensive military movements. Whilst the commander of the French army was hovering upon the borders of Germany, considering at what point he would invade it, he found his army suddenly enveloped and placed at disadvantage by topographical movements on the part of the Germans, so rapid, unerring, and masterly that, instead of invading Germany, the French were thrown at once upon the defensive, a position from which they were never allowed to recover; each strategic movement of the Germans being followed by the defeat of the enemy, until the whole organized military force of France was overcome, and the terms of peace, which involved a dismemberment of the nation and the payment of the expenses of the war, were dictated by the Germans in the armed possession of Paris.

This remarkable event, the sudden demoralization and rapid conquest of a great nation, was the result of skilful military movements, performed by an army thoroughly acquainted with all the geographical features of the country over which it was moved. It was a war fought as much by maps as by weapons. The military read that directed it remained in his tent, giving his orders surrounded by his maps. Each officer had his map; and no military body, however small, moved in any direction without being provided with a most accurate map and other information of the country through which it was to pass. In other words, geographical knowledge was organized, subdivided, and distributed with the same system and order as rations, arms, or ammunition. This instructive lesson has its warning. It teaches that, if the fate of a nation may depend upon a battle, a battle may depend upon a knowledge of geography,—a significant indication to every country of the importance of the science for the advancement of which geographical societies have been instituted.

A congress was held in Vienna to arrange for the measurement of a segment of an arc of the meridian in the centre of Europe. It was agreed to adopt as the European measure of length the metre fixed by the French commission, and that the measurement of the segment should be from Christiania to Palermo.

M. Houfaldy has completed and published the result of his explorations and researches in the Finnish provinces on the Baltic. The name of the people, Finns, he says, is derived from "lake", and that "Finlander" means "lake-dweller". His researches in the language and ethnology are very valuable. He describes the people as moral, frugal, highly cultivated, and intensely national. They have a national literature, and conduct their proceedings in their courts of law in their own language. He says that as a race they are totally different from their German or Slavonian conquerors, and thinks that they are destined hereafter to fill a larger place in the world's history.

A private individual, Prince Torlonia, has accomplished what Augustus, Claudius, and Nero had attempted in vain. He has drained that pestilential marsh, Lake Fucina, in Italy, forty-two miles in circumference, and the land which it covered is now cut into large squares of fertile territory, intersected by magnificent roads. The work occupied fifteen years, employed 30,000 persons, and cost Torlonia more than $5,000,000. The question was whether he would drain the lake, or the lake drain Torlonia. He has answered it.

A recent survey of the tract lying between France and Germany shows that the River Aar is the true Rhine, and the stream which falls over Schaffhausen is merely a tributary.

Our member, M. Du Chaillu, has been occupied for the last year in following up his previous explorations and studies in Sweden, Norway, and Lapland. He has traversed these countries thoroughly in various directions, having made two visits to North Cape, the most northern point of Europe, of which he has taken photographs. He has given especial attention to the remarkable features of the country, its natural history and physical geography, studying the great glaciers of Scandinavia, and the geological changes resulting from the rising and sinking of the land. Great facilities have been afforded him by official persons and the people generally, with whom he has mixed extensively, familiarizing himself with their language, character, customs, and habits. He has taken a large number of photographs, particularly of natural scenery and objects of scientific or archæological interest. He has just returned to this city, and is now occupied in the preparation of a work upon Sweden, Norway, and Lapland, which I am sure will be one of great interest.

Meteorology and Hydrology.

A meteorological congress was held last summer in Vienna, in which the agreement was unanimous as to the great importance of one synchronous observation of the weather at all stations throughout the world.

Our own signal-service throughout the year has been materially extended, stations having been erected on the elevated ranges of the Rocky Mountains.

T. B. Butler, of this country, has recently published a work upon meteorology, distinguished by original views, the practical knowledge of the writer, and by the discussion of facts more than theories. He denies Halley's hypothesis that storms are produced by the upward suction of heated tracts of air, and maintains that electricity is the chief cause of meteorological phenomena.

The national school-ship "Mercury", of this city, commanded by Capt. Giraud, has been engaged during the year in deep-sea researches. Capt. G. surveyed a large portion of what is called the volcanic region of the Atlantic Ocean, where he found the water very deep, and the specimens brought up indicating a volcanic origin. A deep-sea thermometer was used upon one occasion at a depth of 2,040 fathoms, two miles north of the equator, in 22° 16′ west longitude. At the surface the temperature was 81° Fahr.; at 1,000 fathoms, 38°; at the greatest depth, 35°; and in the voyage from the Canary Islands to Rio Janeiro it was found at uniform depths to vary only about two degrees.

The "Challenger", the objects of whose voyage I gave an account of in my previous address, when last heard from was on her way to the Cape of Good Hope, where she is to refit; that point being the completion of the first stage of the expedition. Her earliest deep-sea sounding was taken off Cape Finesterre, in 1,125 fathoms; and her deepest sounding was southward of Saba Island, one of the Dutch West-India Islands, in 3,875 fathoms, nearly four miles and a half; the enormous length of line which was run out to the bottom in about one hour and a quarter having about three hundredweight of sinkers. A measurement of the meridian was made by means of the electric telegraph between Gibraltar and Malta. Star-fish brought up from 600 fathoms near Cape Vincent were unable to adapt themselves to the various degrees of pressure, and when relieved from that to which they had been accustomed they expanded to bursting.

The soundings between Lisbon and Madeira indicated that a submarine basin similar to that of the Mediterranean and Black Sea existed there, with its outlet between Madeira and the Canary Islands. Capt. I. E. Davis, R. N., from whose communication I have derived most of the particulars of the labors of the expedition during the year, says that if the configuration of the ocean-bed in this vicinity could be seen with Madeira on the north and Teneriffe on the south, it would rival the loftiest range of the Himalayas in grandeur and sublimity. A crustacean similar to the lobster or prawn, brought up from 1,900 fathoms, was found to be without eyes. In very deep-sea soundings (3,150 fathoms) in the tropics, longitude 35° 11′ west, the dredge brought up no trace of organic matter; the bottom, which extended for 700 to 800 miles, being a smoot clay of a reddish color; and wherever over this section the water exceeded a depth of 2,700 fathoms, this red clay was found. The last important intelligence received is, that, in the further course of the vessel south, a cold current was discovered running north along the coast of Brazil, the temperature being 32.5 at a depth of under 2,500 fathoms.

Prof. Mohn, of Christiania, has been investigating the results of the observations of deep-sea temperatures between Greenland, Spitzbergen, and the North of Europe. He finds that the Gulf Stream in summer is warmest on the surface-layer close to the coast of Norway, and from there exhibits a sensibly decreasing temperature with the depth until the freezing-point is reached; and that the fiords of Norway, that are protected by their banks from the great Atlantic depths, are filled to the bottom with the water of the Gulf stream.

The temperature of the winds and the currents of the ocean have, for some time, been the subject of extensive observations by the Dutch. Fifty-one thousand observations made by officers of the Dutch navy in the Atlantic, after careful study, have been arranged and published in a series of charts by the Royal Meteorological Institute of the Netherlands. These charts give the surface-temperature of the North Atlantic between 30° and 52° north latitude and zero, and 50° west longitude, which is the route chiefly traversed by vessels between Europe and America. This is a most valuable contribution to our knowledge of the surface-temperature of the ocean, and comes appropriately from the countrymen of Varenius, the founder of the science of physical geography.

A bottle is said to have been picked up last summer upon the coast of Alabama, containing a writing stating that it had been sent from a foundered ship called the "James", off Alaska, June 29th, 1870. If this should be true, this bottle would seem to have drifted through the North and South Pacific oceans; to have doubled Cape Horn, passed by the great equatorial current into the Caribbean Sea, and thence around the Gulf of Mexico until it reached the territory of the United States again, on the shores of Alabama, and would indicate, to a certain extent, the connection and direction of currents in this long circuit.

Asia.

Asia has been during the year a scene of considerable activity in geographical exploration. Mr. Ney Elias, with but a single Chinese servant, made a most important and difficult journey from Pekin through Chinese Tartary and across the desert of Gobi to St. Petersburg; determining positions by astronomical observations at certain points on the route, so that the geography of the region traversed can now be correctly laid down. One of the chief objects of this journey was to search for the ruins of the ancient capital of Genghiz Khan; but no ruins could be found where the city was assumed to be by Du Halde and Yule. In the thirteenth century it was a vast camp of the great Khan, and the traveller Rubruquis found there goldsmiths from Paris and traders from various parts of Europe.

Baron Von Richthofens has made an extensive examination of some of the northern provinces of China, with a view mainly to ascertain their mineral resources and agricultural products. The account given of his journey and its results are exceedingly interesting and important. His investigation has been thorough, and the information he has brought back is of the most definite kind respecting the geography, the people, the natural resources, and the present political condition of the country. He tells us that, in the wide distribution of coal, China is one of the most favored countries upon the earth. Her coal-fields cover 400,000 square miles, and yet not a single mine is worked. Her supply of iron, moreover, is inexhaustible, and she smelts very little. If we had a few more such explorations, we would know something of China.

Dr. Martin, the physician of the French legation at Pekin, has written a paper upon the population, geographical position, and climate of Pekin. His conclusion respecting the population is, that it has been greater than it is now; that it has decreased during the present dynasty; that it has never been so great as has been commonly supposed in Europe; and that it now consists of between 800,000 and 900,000 Chinese, 35,000 Mahometans, and about 200 Europeans. I may add that the Abbé A. David is exploring the province of Chen-Si.

We have now a definite account of the interesting journey to which I referred in my last address, of Mr. Fedchenko, the Russian traveller, from Khojend to the source of the Syr Daria, or Jaxartes, embracing the exploration of the Alai range of mountains,— a journey of much geographical importance. It has fixed the position of the watershed between the Syr Daria and the Oxus, and led to the discovery of the northern source of the Oxus and the gigantic Trans-Alai Mountains, behind which is supposed to lie the Pamir Steep, which Mr. Kennan, who read before us the interesting paper on the Caucasus last month, hopes at some future day to explore. Mr. Fedchenko heard that the plateau of the Pamir Steep is a very extensive plain, so high and with the air so rarefied that the Kirgheez cannot live there. It is deeply to be regretted that this distinguished traveller and naturalist, after surmounting all the perils and trials of this journey, lost his life last summer in the glaciers of Switzerland.

The Russian campaign of this summer, which has culminated in the capture of Khiva, has produced and will continue to produce most important geographical and political results. The letters of Mr. J. A. MacGahan, the *Herald* correspondent in Central Asia, have furnished valuable and accurate information as to the nature of these changes, the most important of which is the addition of the right bank of the Oxus to the Russian dominions, embracing the country north of that river, east of the Sea of Aral. Forty thousand slaves were liberated in the conquered territory, and slavery there and in Bokhara has been abolished. The provision abolishing slavery is said to have been a suggestion made by our corresponding member, Mr. Schuyler. The treaty made has abolished custom-houses, and has given free trade to the Russians, and also to them exclusively, with the Khivese, the free navigation of the Oxus.

The settlement by arbitration of the districts which have been in dispute between the Persian and Afghan governments, which necessitated surveys by engineers; the geographical labors in connection with it of Sir Frederick Goldschmidt, and the exploration and observations of Mr. W. T. Blanford, have added something to our knowledge of the geography of Persia. The results of the exploration warrant the opinion that Persia was anciently a more fruitful and productive country than at present; that it has undergone a change from a moister to a drier climate; and that as the rainfalls diminished, lakes dried up, leaving desert plains. Mr. Blanford says that, from this cause, the plateau of Persia is a series of desert-plains, from no portion of which is there any river; the rain which falls being absorbed or evaporated. The greater part of Central Asia from the Caucasus to Thibet, he says, closely resembles Persia in its physical character; and the conclusion of Sir Henry Rawlinson is that unless means be found to collect the water from the mountains and utilize it in irrigation, there are no hopes for Persia.

Among the most important of recent geographical explorations is that of Mr. Jacob Halévy in the southern part of the Arabian peninsula through the interior of Yemen, a country little known, and where travelling is perilous. His journey extended from Hodegeda, on the Red Sea, in a north-easterly direction through the Wadi Habouna, 18° 55′ north latitude. The first civilization in Arabia was developed in Yemen, and was the work of a people who were not nomadic, but who were attached to the soil, and who believed in a plurality of gods. It was to study the monuments, ruins, and inscriptions of this ancient Sabean civilization that this perilous journey was undertaken, which involved an examination of the geographical features of the country, the ruins of ancient cities, and of interesting monuments, from which Mr. Halévy has brought back 686 inscriptions. On several occasions he owed his safety tc being an Israelite, the inhabitants being comparatively tolerant to those of that religious persuasion, especially in Djaouf, east of Cana.

In this part of the country he found many Sabean inscriptions, and saw the source of the river Kharid, which runs toward the interior of Arabia, and disappears after fertilizing the numerous oases of the Djaouf. He believes this to be the river which is alluded to in a passage of Strabo as having been crossed by the Roman army of Ælius Gallus, in his expedition to the country of the Sabeans. Innumerable ruins in a crumbling condition, he says, cover the soil on the banks of the Kharid and its affluent, the Medheb.

Explorations in Palestine and Syria.

The surveys and explorations in Palestine were prosecuted last year under the auspices of both the English and the American society. The American society has but entered upon its labors. As those of the English are very nearly ended, and as I have hitherto said but little respecting this interesting exploration, it may be appropriate now to give some account of what the English have done. I shall begin with the excavations in Jerusalem carried on by Capt. Warren, to ascertain the ancient site and plan of the city and fix the locality of places of Biblical and historical interest. It was a work of difficulty, in which the explorers ran much personal risk, besides being hampered by the nature of the permission given, which forbade exploration in places sacred to Moslems or Christians, the very places in which it ought to have been made.

The details of this work, which occupied nearly three years, are too numerous to enter upon. Shafts were sunk below the present city in various places to a considerable depth; and discoveries were made of extensive subterranean passages and galleries, winding aqueducts and canals which were cut in the solid rock, chambers, drains, sewers, wells, and tanks. A stream of running water was found, showing that a fountain exists far below the surface and is still running, — a circumstance of interest, as there is now a dearth of water in Jerusalem. Inscriptions in the Phœnician characters in red paint were found upon walls, and many objects of interest were gathered, such as lamps, pottery, weights, seals, gems, and sepulchral chests — some of them very beautiful — containing human remains. An attempt was made to determine the exact position of parts of the Temple, and the site of Solomon's Palace; but while the investigations have had the effect of disturbing many of the previous theories as to the precise locality of places, they have not been sufficiently certain to remove doubts, or to dispense with further inquiry. Much has certainly been added to our knowledge of the ancient city; but it must be admitted, in view of the time, labor, and money that have been expended, that the results have not been so great as were expected.

Before these excavations were begun, Capts. Wilson and Anderson, in the interest of the Society, made a reconnoissance-survey, with occasional excavations, from Beyrout to Damascus; thence to the Sea of Galilee, and then south through Galilee to Jerusalem. Between Beyrout and Damascus, astronomical observations were taken and plans made, with occasional drawings of temples and basilicas. After leaving Damascus, they made their way to the waters of the Upper Jordan to Laisha, the Dan of the Bible, examining the river and its tributaries. They visited Hunin, a place of which nothing is known, though there are there the remains of a vast fortified place so old that "it bears the stamp of every successive conquering race". Farther south they explored Kedes (the Kedesh Naphtali of Scripture), one of the ancient cities of refuge, making excavations among the ruins, and taking photographs; also Jebel Jermuk, the highest mountain in Galilee, 4,000 feet above the Mediterranean, on the top of which, never before visited, they found an inhabited village, the people of which would give no account of themselves. Among other places examined was Meinon, the most venerated place in Palestine, as it contains the tombs of the great rabbies Hillel and Shammai. Their exploration of the shores and their survey of the Sea of Galilee were exceedingly thorough, and have resulted in the most complete map that has ever been made of that interesting locality; and with their tracing of the watershed and sources of the Jordan were connected excavations at Gerizim, the ancient Schechem, which was known before Jerusalem was in existence.

This is but a very limited statement of this interesting reconnoissance. It has settled disputed questions, determined astronomically the position of many places, gathered materials for the elucidation of ancient history, and added much to our knowledge of the topography of the region traversed. Capt. Anderson says, that, in the vast system of the valleys of the route they followed, there is not a hill-top on the ridges between that does not contain the ruins of some ancient city; that the land is undergoing change; that the people are dying out or migrating; that the old habits and customs are disappearing; and that if researches are to be made in exposition of Biblical history, they must be made now, ere the levelling hand of civilization shall have effaced the relics of the past.

During the three years that the explorations in Jerusalem were in progress, Capt. Warren made several reconnoissances into the interior. The first was to the plain of Philistia, lying between Judea and the Mediterranean, the land of the ancient Philistines, where he found a fertile soil neglected, the very existence of which is threatened by the sand that is gradually advancing upon it. One of his objects was to ascertain the site of the City of Gerar, where Isaac had lived, but he failed to find any evidence of it. He visited Gaza, one of the most ancient cities in the world, which was in existence in the time of Abraham, and fixed the site of the ancient city as nearer to the Mediterranean than the present one, which is three miles from it. He also made researches in the country about Ascalon. His next reconnoissance was in the comparatively unknown region east of the Jordan, where he fixed the latitude and longitude of many places, and took a great number of photographs of ruins, temples, tombs, etc. It is a country of ruins. They are, he says, everywhere. Over a tract of four miles square there was a never-ending succession of ruins. On every rising ground there had been a village; on every hill-top, a temple. He found in the pointed arches, proof that a domesticated people lived here after the fall of the Roman empire. It is now occupied only by the Bedouin. His visit was too short to enable him to accomplish much. The region is the one now undertaken by the American society. His third expedition was an exploration of the Jordan, in which he went up one bank of the river, and returned by the other, making geographical observations especially with reference to further surveys. His last reconnoissance was in Lebanon, and was chiefly devoted to the sketching and measuring of temples, and the examination of Mount Hermon, of which an elaborate investigation was made.

The next important undertaking was the survey of the peninsula of Sinai, under the direction of the British Ordinance Survey. The conclusions arrived at by those engaged in this exploration and survey are: 1. That this peninsula was the scene of the events recorded in the history of the Exodus, and its examination has certainly furnished a remarkable corroboration of the truthfulness and accuracy of the Biblical history. 2. That the country is extremely wild and rugged; that it has one of the most complicated systems of drainage in the world; and that the present barrenness and desolation are due to neglect; that formerly it was well wooded, its mountain-sides terraced with gardens, its rushing waters regulated and utilized, and that this fertility lasted until comparatively modern times. 3. That Jebel Musa is undoubtedly the mount from whence the law was delivered; its form, position, and the surrounding plain indicating unmistakably that it was here that the multitude assembled to listen to the words of Moses. This last conclusion is disputed by the learned Dr. Beke, who says that Mount Sinai is farther to the north-east, in the desert in the vicinity of the Gulf of Akabah, and he is now collecting a fund in England to enable him to go out and search for it. He argues that Mount Sinai, from the account of it in the Bible, must have been an active volcano in the time of the Exodus, which he thinks is now extinct. Mr. A. L. Rawson, who is present, tells me that he made three trips across this desert in 1852–1853, and that there are no indications of volcanic action in the quarter referred to by Dr. Beke. The geological specimens collected by him in these two journeys are in the Museum of the Central Park in this city.

The Desert of the Exodus — in which the Israelites wandered for forty years, which lies between the peninsula of Sinai and Palestine, now known as the Desert of Tih — was explored by Prof. Palmer and Mr. Drake. They found it a country nearly without water, the solid ground covered by flint so worn and polished as to resemble black sand, with a considerable distribution of a brown, parched herbage which bursts into life in the spring, but is dry and dead during the greater part of the year. In the southern portion of this desert, stone circles and cairns were constantly found, indicating the former existence there of an extensive primeval population. After this desert is passed, that is in the hill-country south of Palestine, the primeval stone remains of a prehistoric race were found; and the fenced enclosure, also, of a pastoral people, supposed to have been the Amalekites, who lived here in the time of the Exodus. Further north were the ruins of once populous cities, the seats of civilization and culture; but the incursions of armies, the stopping-up of wells, the destruction of trees and of works for irrigation, have left the country a scene of desolation. The Arabs who now inhabit it are among the wildest and most intractable of the Bedouin tribe. Half of the desert is the work of these Bedouins, who will not labor, but live by plunder; and it is due to them that many a fertile plain, once occupied by an industrious people, is now a barren wilderness.

The explorers may be said to have traced with approximate certainty the path of the Israelites in their journey to the Promised

Land. The whole country traversed was carefully examined, and abounded in ruins of cities, fortresses, mounds, churches, wells, rocks, dwellings, etc.; with spots of great fertility and cultivation, others waste and desolate; many places still retaining the names they had in the days of David.

This exploration was made by Messrs. Palmer and Drake on foot for a distance, in one direction, of 600 miles, without attendants, the explorers doing everything for themselves, dressed in the garb of the country, and speaking the language of the people. After reaching Jerusalem they again went southward to complete their examination of what is known as the south country. From thence they explored Edom, the country lying between the Dead Sea and the Gulf of Akabah, which they found a fertile land, fully justifying Isaac's prophecy to Esau, and which, but for the curse of the Bedouin, might, they say, become one of the most wealthy, as it is one of the most picturesque, countries of the world. They then passed northward into Moab, finding everywhere signs of its former wealth and cultivation, exploring the country, and examining many ruins, and practically closed their labors standing upon the mountain where Moses for the first time looked upon the Promised Land. The portion of the country traversed by them—of which, so far as known, they were the first explorers—was the portion between Wady and Ghamr and Wady Maderah, about fifty miles. The other parts of their route have been passed over by different travellers, among others by the late Dr. Robinson, of this city. This expedition has added to our knowledge of the geography of the region visited, and has confirmed, in a remarkable degree, the accuracy of the Biblical topography.

The operations which are now going on consist, first, of the survey of the whole of Palestine between the Mediterranean and the Jordan, by Capt. Stewart, R. E., and his assistants, under the direction of the English society. About 1,600 square miles had been surveyed up to last summer; and, as the survey is steadily proceeding, it is now, of course, largely extended. With this survey is connected a searching archæological investigation. A geological map of the country is to be constructed, and a collection is being made of botanical and zoölogical specimens.

By an arrangement with the English society, the survey of the country lying east of the Jordan and of the Dead Sea has been undertaken by the American Palestine Exploration Society. It embraces the part of Palestine which is the least known, and is in territorial extent three times as great as the country surveyed by the English. It abounds in ruins, inscriptions, and objects of great interest; and its exploration will undoubtedly throw a great deal of light upon Biblical history, as well as upon the former history of the country lying midway between Assyria and Egypt; the region to be explored being what was formerly the principal highway between these two great ancient civilizations.

It was here that the Moabite Stone was found, the interest of which is not alone the record of long-past events which is inscribed upon it, but the fact that it sheds more light upon the invention of our alphabet than anything before discovered. In the language of the late learned Mr. Deutsch, "it illustrates to a hitherto unheard-of degree" the origin and history of the art of writing as we possess that priceless inheritance.

The American expedition, as I stated in my last address, was placed by the American society under the command of Lieut. Steever, U. S. A. Lieut. Steever spent about five months in explorations east of the Jordan. He has surveyed about 600 square miles, and has prepared a very valuable map. The explorations were in Edom and Moab. Various sites have been satisfactorily identified, and the positions of Mount Nebo and Pisgah determined. The levels of many important spots were taken, a number of ruins in Moab examined, and interesting inscriptions copied.

There is frequent mention in the Bible of Gezer, in the land of Canaan, a very ancient city which was in existence before the Israelites entered Egypt. It had hitherto been sought for in vain, but during the past year Mr. C. Ganneau, to whom the world is mainly indebted for securing the fragments of the Moabite Stone, succeeded, through a reference in an Arab chronicle, in discovering its site, which corresponds admirably with the topography given in the Bible. The ruins show a large and ancient city, occupying a vast plateau on the summit of Jeb Azar, which is about half-way between Jerusalem and the Mediterranean. He was able to trace in part the plan of the old city and the position of the houses and suburbs. On one side were quarries of considerable size, from which stones had been taken for the city, and beyond were many tombs excavated in the rock.*

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*Mr. A. L. Rawson here stated that he discovered Gezer on the same site in 1852, and made a sketch of it; that it will be found to be so located upon the map of Palestine which he published in this city in 1856.

The Rev. Samuel Jessup, an American missionary, has recently given an account of the ruins of Husn Sulayman. They lie in a secluded spot in the heart of the Nusaireeyeh Mountains in Syria, two days' journey from Tarabulus, or Tripoli, on the Mediterranean, of which ruins hitherto but little has been known. The name denotes the stronghold of Solomon; but the principal enclosure has not the situation or appearance of a fortress, for this beautiful ruin is seen from the summit of the mountain-ridges which nearly encircle it, lying below in the centre of a little basin, and may have been a summer-palace of some forgotten Syrian ruler, or else a sacred enclosure erected in this secluded mountain-top for the worship of the Sun. The latter supposition is probable, for the carving as well as the style of the building, which is built of huge blocks of a yellowish-gray limestone, taken from the adjoining mountain-side, resembles the Temple of the Sun at Baalbec. The carving is chaste, and the entire structure grand and impressive. "It has remained here," says Mr. Jessup, "for many ages, almost never disturbed by any intruder." His article, with engravings of the ruins, is published in the second statement of the American Palestine Exploration Society.

Mr. A. Johnson has recently visited the people who dwell in the mountains which connect the Taurus with the Lebanon range, and lie along the Syrian coast. This strange people, he thinks, are the descendants of the ancient Canaanites, who, driven by successive conquerors from their former homes, found a secure refuge in these dark mountains. Their religion is a mixture of the worship of Baal; of Astarte, the Phœnician Venus; of fire; of the heavenly bodies, and of Mahometanism and Christianity, with traces of the Jewish law,—all strangely blended. The tribes are allied, but not at peace, for the practice of blood-revenge is universal, and produces the same disastrous consequences as in the Caucasus, and other parts where this barbarous custom survives. Mr. J. found them an interesting people, the men and women, unlike Eastern communities, mingling freely together. He took measures of the mountain-heights reached by him, and gave some attention to the geography and geology of the region. Prof. J. Strong left this city last December at the head of an expedition for explorations in Palestine, Syria, Asia Minor, and Greece, which, it is said, are to be geographical and archæological.

I mentioned last year the various plans for a line of railroad to connect London with India. The line recently surveyed by Messrs.

Low and Thomas is to make use of the existing lines of the Mont Cenis Tunnel to Trieste, and thence through Austria, European and Asiatic Turkey, Persia and Beloochistan, to Kurrachee, and thence to Bombay; making the whole journey from London in about five and one-half days. Its course from Constantinople would be to Adalia, on the Mediterranean; thence along the coast to the port of Iskanderun (Alexandretta), in Northern Syria; from thence it would take a south-easterly course, proceeding along the Valley of the Euphrates, to the western extremity of the Persian Gulf, and following the shore of the Gulf and the Arabian Sea to Kurrachee. M. Lesseps, whose name and fame will be forever identified with the Suez Canal, proposes a different route, — viz., from Orenburg, at the dividing line between Europe and Asia, to Peshawur, the northern terminus of the railroads of India; by which route, he says, a traveller could go from Calais to Calcutta in six days.

Mrs. Burton, the wife of the distinguished traveller, who, with her husband, has spent some time in examining the feasibility of routes through Syria, insists that to cross the North of Syria would be through a comparatively poor country, where the road would never pay its expenses; that it is also unhealthy; and that the true course is to carry the line to a more southern port than Iskanderun, before crossing Syria, and running it then through what would be the richest land in the country, where the climate is good. Strangely enough, the route which she insists as being now the most practicable is the old route of the ancients. Its point of departure would be from the site of ancient Tyre, now a thriving little town; and Baalbec and Palmyra would become stations. If this should take place, India and Europe would communicate as they did 2,000 years ago. If Tyre should now become a place of importance, and Baalbec, now the site of magnificent ruins, with about two hundred inhabitants, and Palmyra, now tenanted by about thirty mud cottages, should again spring into life, it would be among the railroad-marvels of the age.

Africa.

The geographical intelligence from Africa during the past year is varied, but not so interesting as the previous year's. It embraces the progress of expeditions, the return of some, the organization of others, and the efforts of individual explorers. A renewed interest has been excited in the gold and diamond fields of South Africa. The negotiations of Sir Bartle Frere with the Sultan of Zanzibar for the extinction of the slave-trade upon the eastern coast has ended; and his effort, it is hoped, will diminish, if it do not extinguish, that infamous traffic. Mr. Kirke, the consul at Zanzibar, has examined the mouth of the Lufigi, a stream upon the East Coast, and transmitted an account of the result to the Royal Geographical Society. Dr. Nachtigal reached Wadai, the country where Dr. Vogel lost his life, from whence he travelled by Darfoor to Kordofan, reaching Khartoom near the close of the year, and is the first European who has communicated any information respecting Wadai. The East-African Expedition, for the relief of Dr. Livingstone, when last heard from, on the 24th of July, had passed Ugogo, and expected to reach Unyanyembi in a fortnight. They encountered many difficulties, and Lieut. Cameron, in the trying situations in which he has been placed, has proved himself a most efficient commander. Dr. Rohlfs, who made the journey through North Africa from Kutha to Lagos, has by this time probably started upon an expedition, at the expense of the Viceroy of Egypt, for the exploration of the Lybian Desert, having with him a botanist, a geologist, and a geographer; and Dr. Hildebrand, a German botanist, has undertaken an expedition to East Africa, from which important results are anticipated.

The return of Sir Samuel Baker is exceedingly gratifying, the greatest interest having been manifested in this country for his personal safety, and the deepest sympathy felt in the success of his expedition for the suppression of the slave-trade in the regions of the Upper Nile. It would be premature to state positively the results of this great enterprise, for they can only be ascertained when the great basin of the Nile shall have actually become one Egyptian province.

The difficulties which he encountered were in no way owing to him, but to the intrigues of the ivory and slave traders, with whom the Turkish commander had fraternized. The Governor-General of the Soodan was also opposed to the expedition, and did not execute the orders he had received; so that when Baker arrived there, in 1870, he found neither vessels, men, nor provisions ready. An impassable barrier, moreover, had formed at the mouth of the Bahr-el-Ghazel, by which he was delayed there ten months. His provisions were exhausted, and the promised supplies from Khartoom did not arrive; so that he could not reach Gondokoro until the end of 1870, and when he did, the overland transport of steamers, etc., that he had contemplated could not be effected, and he was left to pursue his operations with but 200 men, a part of his equipment. The subsequent details, the efforts to poison his men by the chief Kabrega, the murder of his messenger, the surprise of his camp, his successful escape and retreat, his alliance with Kiongo, the attempt of Abu Saut, at Fatiko, to have him killed, and finally his organization of a government over the vast district of Fatiko, and the good effects it produced, show the indomitable perseverance, courage, and capacity he exhibited. Mr. M. L. Hansell, our corresponding member at Khartoom, writes to our General Secretary, September 17th, 1873, that if the transportable steamers, now at Gondokoro, could be brought beyond the cataracts and used for exploration on the Nyanza, it would lead to important, scientific, political, and commercial results. He also says that the trade in ivory does not pay its expenses, and is simply a cover for the slave-trade. He advises us that Mr. Marno attempted to force a passage for his vessels in the marshy region of the Bahr-el-Ghazel, and, after being detained there for six months, came back to Khartoom, and that he has returned to Europe.

Mr. Miani, the celebrated Italian traveller in Africa, a native of Venice, from whom we received a most interesting communication some years ago, undertook a journey of exploration south-west of the White Nile, and partly through the country first visited by Dr. Schweinfurth, with the design of reaching and exploring the western shores of Lake Mwutan Nzigi (the Albert Nyanza). On the 9th of this month, we received a letter from Mr. Hansell, written by him at Khartoom, conveying the sad intelligence of Miani's death, which occurred in the Monbutta country, October 21st, 1872. Miani was a white-bearded, patriarchal-looking man who had spent the best years of his life in Africa, and he travelled further *up* the Nile, following the river, than any other white man. At the farthest point he reached, in sight of Apuddo (latitude 3° 44′), he cut his name in bold Roman characters in the bark of a tamarind-tree which Speke and Grant discovered on their walk across Africa. Miani unfortunately became involved in controversies with Speke, Grant, Baker, and other English travellers which did not place his extraordinary devotion and great experience as an African explorer in the happiest light before the European societies. But where he was known, this venerable Italian was respected for his modest and quiet demeanor, and for the honest enthusiasm and fearlessness with which he carried out his daring enterprises.

M. Beysselance, an experienced French traveller and naturalist, is about to explore the unknown country between the basin of the Nile and the Ogowai and Shari, including the Albert Nyanzi; and Munzinger Bey has made explorations in Takka and Bogos.

On the North-African coast, Capt. Moucher, in the Narval, has been making hydrographic explorations, especially in the vicinity of Algiers; and H. D. Lacase Dutiers has been dredging for the examination of the fauna of the Mediterranean. Gen. Gallifet made a military reconnoissance into the Desert of Sahara, during which, geographical notes were made, and from the marks of erosion and the distribution of boulders it was thought there was evidence over that desert of past glacial action. MM. Soleillet and Vignard are about to proceed from Algiers for the scientific study of a part of the same great desert. M. C. Tissot has traversed certain parts of Morocco, and made most interesting discoveries, among which are Banasa, a city founded by Augustus and described by Ptolemy, but the site of which has heretofore been unknown. Mr. Tissot traversed the whole line of the Atlas Mountains, and, from the information gathered there and elsewhere, thinks that he will be able to fix the Roman itineraries in Morocco. M. Duveyrier has submitted to the French Geographical Society a very full statement of the explorations of the French south of Algeria, from 1859 to 1872, which comprises a large amount of geographical details, scientific observations, and linguistic researches, derived, in a large degree, from his own explorations, as well as from the labors of others. He speaks of a race of Berbers in the Sahara called Imohagh, who are white, and by whom the custom of the sex is reversed. The men wear veils, and not the women; and the man, he says, would consider himself dishonored if he exposed his face, and, therefore, wears his veil at all times, walking, riding, or sleeping. They treat their women with great respect. The women alone are acquainted with the art of writing, and exercise, he says, a great influence in politics. I can only regret that my limits forbid an extended account of this most interesting communication.

On the West Coast there has been great activity. We have the account during the year of an expedition by Prof. Blyden to Falaba, a country of the interior, lying north-east from Sierra Leone, which was very little known. The journey was made with great difficulty, each petty tribe exacting contributions from every one that passes through its territory, which here, as in other parts of Africa, is a barrier to all commerce with the valuable countries in the interior. Falaba was found to be a land of extensive and fertile plains; both it and the countries about it having vast agricultural capacities. The people were orderly, well-fed, well-clothed, and very desirous of intercourse. It is also a gold-bearing region, and in certain parts the gold is said to be abundant.

MM. Compeigne and Marché have undertaken to penetrate Equatorial Africa in the vicinity of the Gaboon. Their object was to trace the course of the Ogoone, and the lakes to which it is supposed to lead, one of which is reported to be a very large one. The last accounts of Lieut. Gandy, the commander of the West-African Livingstone Expedition, is, that he left San Salvador, the farthest point in the Portuguese dominions, for the country east, which is nearly a blank upon our maps. A German expedition, organized by Dr. Bastian and the Berlin Geographical Society, left last spring for the exploration of Loango. The Doctor and his associates passed some time on the coast gathering information and preparing for this important expedition, in the course of which they made several excursions. The information they had received led them to believe that after a three weeks' journey from the coast they would reach an open country with metalliferous mountains, where a people dwell who understand the manufacture of gunpowder; and that a great river is there spoken of by the natives, variously called the Congo, Bongo, and Lualali. They are confirmed in their belief that they will find an indigenous race of dwarfs similar to those seen by Du Chaillu, several specimens of this type having been met with upon the coast. They are called Obongo, Babongo, or Vambuta; but Dr. Bastian declares their proper name to be Bari or Bali. The Doctor went up the Congo to Embomma, to ascertain the truth of the report about Dr. Livingstone, or that a white man had been seen approaching the coast, and learned that there was no foundation for it. The Doctor has returned to Germany, and the expedition, I suppose, has started for the interior.

Besides the explorations which are the special object of expeditions and travellers in Africa, it should be remembered that there are hundreds of residents living on the coast, or having trading outposts in the interior, who are annually contributing a rich fund to geographical knowledge by correspondence or publications. A corresponding member of this Society, Dr. Albert Bushnell, is living at the Gaboon, near the equator, who supplies us with valuable letters. Herr Hansell lives at Khartoom, the junction of the Blue and White Niles, and is a corresponding member who takes an active interest in our Society. Munzinger Bey, one of the ablest geographers and most experienced travellers, the first authority on Abyssinia, is our corresponding member at Massowah. I should not pass without remark the warfare going on in different parts of the African continent. Violence and bloodshed are chronic in almost every latitude of that continent. From the Fellahine of Egypt, in the upper provinces, who often revolt against the authority of the Khédive; through the deserts roamed over by the restless Bedouins; over the great central plateaux, where flow the headwaters of the Nile, down to the Cape of Good Hope, thousands of lives are annually destroyed, because civilization would seem to have turned her back on Africa. The Ashantee war, which is now being prosecuted with vigor by Sir Garnet Wolseley, aims at the reduction of a people, one of the bravest and most energetic under the tropical sun. Whatever may be the grievances of either party to the conflict, the conquest of Ashantee with its 3,000,000 of population, whether it means permanent annexation to the British colonial empire or not, will be considered in the hereafter of history as a movement that was begun not a moment too soon, and prosecuted with a devotion not a degree too intense.

Australasia.

Capt. Morsby, of the Royal Navy, of Her Majesty's ship "Basilisk", has explored a portion of the shore of New Guinea to the east end of the island, embracing the coast and islands in Torres Straits, which was connected with important surveys. The details of this valuable work are too great for me to enter upon. Contrary to the impression previously entertained, he found the people, who are a copper-colored race, friendly and intelligent; very superior to the black races of other parts of New Guinea. He found them, like the Malays, living in houses erected upon poles, and they were acquainted with the art of making pottery. He says they are a pleasant and genial race of savages, slightly addicted to cannibalism. Capt. Morsby is of opinion that the route between China and Australia will be hereafter through the China Straits, as they are free from danger, and safe anchorage can be found anywhere. He examined a portion of the northern shore of New Guinea for about twenty-five miles in his boat, and found it washed beyond East Cape by a clear reefless sea; the shore enclosed by a coral-wall, along which a ship may sail in safety, and find good anchorage in any of the bays where a beach is seen. He speaks in high terms of the beauty and fertility of this part of New Guinea; a great variety of products grows in the valleys, and many of the mountains are cleared and terraced to their summit with plantations. Mr. Macfarland is about to proceed to New Guinea in a steamer supplied by Miss Baxter, of Dundee. He proposes to visit both sides of the eastern peninsula; to carefully examine them for a mission-station, to collect geographical information; and he anticipates that, eventually, the more healthy region of the interior mountains will be reached.

Signor Beccari, the Italian naturalist and traveller, has continued his explorations in New Guinea but with indifferent success, and he writes unfavorably of the climate. His recent explorations have been in the Aru Islands, where, he says, no venomous animal is found; but in the surrounding seas there are poisonous fish. He writes somewhat despairingly of his efforts, and says that these islands are as unhealthy as New Guinea.

In March last, Dr. A. B. Meyer, with a small schooner, went to Dorey, a missionary settlement on the north-west of Geelvink Bay, in New Guinea, for the exploration of that island; his principal object being to cross this great island, if possible, from east to west. The prevalence of the east monsoon after his arrival prevented his making the attempt then, and he passed some time in exploring the islands in Geelvink Bay of Mysore and Jobi, in the latter of which he spent some time making researches in natural history. He returned to the Island of New Guinea, and finally succeeded in crossing it, which had never before been accomplished. On the south-west, the island is indented by a deep gulf (McClure Gulf), extending far into the interior in the direction of the great Geelvink Bay on the north-east side; the space between the two being the narrowest part of this great island. It was across this space from Geelvink Bay to McClure Gulf that Dr. Meyer's journey was made, which has established what was before unknown,— that there is no communication by water between the gulf and the bay. The journey was a perilous one, as the coast Papuans in nearly every part of New Guinea are in perpetual war with the mountain-tribes. Dr. Meyer's impressions of the natives and of the country are more favorable than those of Beccari, and he had better opportunities for observation. He ascertained that some of the mountain-tribes on the north coast, on the coast of Geelvink Bay, and in the mountains of the Island of Jobi, are cannibals; the Papuans, however, whom he encountered, though at first hostile, were afterwards friendly; and he describes the natives generally whom he saw as having all the virtues and vices of savage races. He made large collections in natural history, and says that the Dutch have taken possession of the western half of the island, but that the whole eastern half is free for any nation to colonize.

Mr. J. Thompson and Dr. Maxwell penetrated to the great mountain-ranges which traverse the Island of Formosa from north to south, and found it occupied by a robust, erect, well-built race of savages, of aggressive disposition. The explorers ascertained that coal is widely distributed over the island, and that the central mountain-range is richly wooded.

It would be premature to speak now of the results of the Dutch expedition for the reduction of Acheen. Indeed, that important movement, like the Khivan and Ashantee campaigns, concerns us only in so far as it changes the political geography of the portion of the globe where it is operating; and thus far there has been no result.

Mr. Ernest Giles and Baron von Müller have been engaged in exploring Central Australia, west of the Transcontinental Telegraph Line, and have gathered a great deal of accurate geographical information. They found a great salt marsh, or lake, 120 miles long. Tin-ore has been found in Queensland in great mass, a most valuable discovery; and extensive beds of hematitic iron, in connection with both coal and limestone, have also been recently discovered in Australia.

The telegraphic event of the year has been the completion of a line of telegraph across the entire extent of Australia, from south to north; that is, from Adelaide, in the south, to Port Darwin, in the north, a distance of 2,012 miles. The line of this telegraph will be nearly indicated upon the map of Australia by the delineation to be found there of the route traversed by Stuart in 1862,—a route, however, so imperfectly known, that the engineers engaged in the work had, in fact, to be explorers. The work was one of great difficulty, being impeded by the tropical rains, the decimation of animals, and other impediments. The geographical results are, that there is generally in the interior abundance of pasturage and water. The climate is good, the soil fertile, and the greater part of the country is well adapted for raising cattle and growing corn. The completion of the telegraph across Australia gives a line from Adelaide to Gibraltar of 12,462 miles, of which 9,146 miles are submarine. The practical result is, that Australia now receives news three weeks earlier than the latest brought by the mail steamers. The last geographical intelligence from Australia, received yesterday, is the discovery by an expedition despatched by the government of Queensland, of thousands of acres of the richest sugar-growing lands, in the vicinity of the coast north of Cardwell, in which two new species of the banana were found, and a large addition made to the flora of this portion of Australia. As this discovery was on or near the line of the mail route to be established to Torres Straits, this new land will be rapidly settled, and with this remote and last civilized portion of the earth I will take leave of the geographical work of the world in 1873.

MR. SAMUEL B. RUGGLES, in rising to propose a vote of thanks to Chief-Justice Daly, said:

I feel well assured that I do but express the unanimous feeling of this large and intelligent audience with the very interesting, comprehensive, and exhaustive address of our President, to which we have all listened with so much pleasure and instruction, when I move to tender him a vote of thanks, and that this able document be published in an enduring form. In doing so I cannot omit the opportunity of calling attention to one of its particular effects in falsifying the assertion of a very distinguished English statesman and writer, Edmund Burke, that the profession of the law has a tendency to narrow and belittle the human intellect; for, here we find the Chief-Justice of one of our large and important courts in this great metropolis not only discharging his juridical duties with signal ability, but finding time and the inclination to embrace this great physical world of ours in his grasp; to watch all its varying processes; to take it into his hand, so to speak, as its custodian; and, annually, to make report of its condition and development; covering within his survey all the lands and all the seas within the reach and knowledge of civilized man. For one, I feel myself, as a citizen of this vast nation forming so considerable a portion of the globe, deeply obliged and indebted to the distinguished gentleman for his thorough and well-directed efforts to elevate and sustain the scientific character of our country in this grand and liberalizing field of human thought and action. The judicial tribunal over which he so well presides as its Chief-Justice, so far from belittling or dragging him down, is itself elevated and dignified by his admirable efforts in this larger sphere of scientific study and research.

The motion, which was seconded by the Rev. William Adams, D. D., in a felicitous speech, was applauded and adopted unanimously.